

Q U A N T A

**THE NEWSLETTER OF
THE INDEPENDENT QL USERS' GROUP**

VOLUME 1 ISSUE 2

MARCH 1984

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INFORMATION ON THE GROUP

Membership of the Group is by subscription to the Newsletter, which is published monthly. Membership details are obtainable from the Group Secretary. Membership of the Group is open to anyone with an interest in the Sinclair QL microcomputer.

Members requiring assistance with problems related to the QL may call the Secretary. An attempt will be made to put them in touch with a member who can help with the problem.

Workshops will be arranged from time to time in various parts of the country.

A membership list is obtainable from the Secretary.

Please send all contributions for the Newsletter to the Editor.

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EDITORIAL

Well, the 28 days delivery promised by Sinclair has been and gone, and to the best of my knowledge, not a single machine has been delivered, although I did hear a rumour that one had been sighted in a software house in darkest Portsmouth.

Customers who placed orders on or before the official launch date of January 12 have received letters stating that "due to phenomenal demand" they should receive their machines by the end of April. I have written to Mr. Nigel Searle of Sinclair on your behalf (the letter is reproduced in this issue) and will publish his reply, when it arrives.

I would not count on getting any machines before May, although I would be delighted to be proved wrong. A friend of mine knows someone who works for Thorn-EMI, who are building (or rather, not building) the QL, and he tells me that they only received the test rig for the keyboard last week (I am writing this on Saturday, 3 March), so they have probably not even started manufacture. This tends to confirm various other rumours I have heard. Apparently Sinclair have been reported to the Advertising Standards Authority over the failure to meet the advertised delivery dates, and have cancelled all their advertising for the time being. Unfortunately, the A.S.A. have no legal powers, so Sinclair can just tell them to get st*ff*d if they issue a reprimand.

A couple of acquaintances of mine visited PSION some time ago, and apparently even they had not got a working QL! I am told that Sinclair would not let anyone near the alleged working QL at the press launch, and I have heard some scurrilous rumours that the demonstrations were simulated. Journalists are known to ingest large quantities of ethanol at such occasions, so most of them were probably too inebriated to notice such a subterfuge.

It is rather interesting to speculate on the reasons for Sinclair's premature announcement of the QL. One reason might be the fact that the BBC contract is up for grabs about now. Sir Clive was apparently rather annoyed that Sinclair were not even asked to tender for the initial contract, so he might be having another go. Another, and perhaps more relevant, factor is the new Acorn business system that will shortly be announced. This will reportedly use the National 16032 processor, that Acorn have been threatening to release for the last couple of years on an add-on board for the Beeb. Someone I know in the semiconductor business told me that Sinclair were thinking of using the same processor in the QL, but National would not reduce the price low enough. Motorola got the 68008 price right down, and apparently got an order for a million 68008 chips and two million EPROMs! If it is true that the QL will be supplied with EPROMs rather than mask-programmed ROMs, this would tend to confirm that there are problems with the software.

I borrowed Brian's membership file, and took the liberty of publishing some of your letters. Well, I couldn't write all this issue, although I do seem to have written most of it, like the first! Unless you specifically request otherwise, I shall publish anything you send in that I think might be of interest to other members. If you wish your name and address to be left out, please say so. My editorial comments will be delimited by “/*” and “*/”. This is the convention adopted in the C language, and seems appropriate, in view of my liking for C. I will retype all material that you send in, as this enables me to correct the more glaring “syntax errors”, and results in a better-looking publication. When we have sufficient members, we hope to be able to put Quanta through a photo typesetter, which will improve the appearance considerably.

Apart from delivery dates, most of the queries received so far are concerned with printers and monitors. A publishing company that has commissioned me to write a couple of books on the QL ordered six machines as soon as it was announced. As soon as they get their machines I will see if I can borrow one to check it out with an Epson FX80, which is probably the most popular printer at the moment, and a variety of colour monitors to find the best buy.

We have well over 100 members now. The response has not been as good as we had hoped, but I would imagine that many prospective members are waiting until they get their machines. As soon as deliveries start, membership should pick up rapidly. We thought it best to launch the group as quickly as possible, so as to pre-empt the possibility of someone forming a commercial group for the QL, like BEEBUG for the BBC computer. BEEBUG is run as a business enterprise. That is not to say that they do not provide an excellent service to members, but they have never circulated any accounts to members (presumably they file accounts at Companies House, being a limited company), and the officers of BEEBUG have never been elected.

On your behalf, I recently attended a meeting of the Association of Computer Clubs, and made sure that IQLUG would be regarded as a bona fide users' group. This will enable us to have a stand at the major shows for a nominal charge. We will have a joint stand, shared with NATGUG, at the London Computer Fair, and the PCW show.

My thanks to Frederick Brown for sending in our first contribution. What about the rest of you? I can write this sort of rubbish until the cows come home, but you might find it rather boring after a while! Perhaps I ought to start using pseudonyms as I used to do when I was editor of ACCumulator, the Amateur Computer Club newsletter.

Leon Heller

MEMBERS' LETTERS

Welcome to the first issue of Quanta! I am sure that it will keep up the high standard that we have become used to see in NATGUG News. Anyway, it has made a good beginning.

It would be useful to have details of Kernighan and Ritchie's book on C - its publisher, price and availability. And whether you would recommend this book rather than others for a very beginner in C. I still find C somewhat indigestible, and hope it will improve with closer acquaintance.

In regard to the 68008 assembly language programming, one's dream is that one can cross-load one of my Z80 assembler programs from the TRS-80 into the QL, and then change this line by line into a 68008 assembler program, changing HL, BC, DE, IX, A into appropriate registers for the 68008, and possibly changing commands LD, CALL, JP, JR, CP, LDIR, etc. into their equivalents. Or will one have to re-write an existing Z80 assembler program totally? Will one have to re-write each address (e.g. FD5F into 00FD5F or 0000FD5F) or will the zeros be implied if they are omitted? As you see, my knowledge of 16-bit assembler is zero, apart from what I have gained from your article. One would like to see an example of a short Z80 assembler program alongside the equivalent 68008 program. Again, is there a book that can be bought as an introduction, apart from the one I am hoping you will write!

I note that the QL normally operates in colour and that one should ideally have a colour monitor. But how satisfactory would a colour television set be, and do Sinclair provide an RF modulator? I presume the QL manual will cope with interfacing to printers, including daisy wheel types like mine.

W. T. Cowhig.
21 Priory Road.
Sale M33 2BS.
Cheshire.

/* Kernighan and Ritchie's book, usually abbreviated to K & R, entitled: "The C programming language", is published by Prentice Hall, Inc., and will cost you around £17; a lot of money for 228 pages! Any Good technical bookshop should be able to get it for you. You might have trouble finding, it on the shelves, as it is a very popular book at the moment. Blackwells at Oxford ((0865) 249111) will supply by post, and accept credit cards. Ask for the Computer Science dept.

In theory, it would be possible to write a program to translate Z80 source code into 68008 source code. The resultant programs would not be very efficient, and might even run no faster than on the Z80! This sort of translation was done for Wordstar when it first appeared on the I.B.M. PC and Sirius machines. I used it, and it really was abominably slow, besides having lots of bugs! Wordstar was subsequently re-written in 8086 assembler. Translation tasks like this are ideal applications for a macro processor such as Stage 2. Stage 2 is in the public domain, and I have a copy. It is extremely difficult to use, however. Have a look at "Macro Processors" by A. J. Cole, published by the Cambridge University Press, if you are interested in program translation using this technique.

In answer to your query about the leading zeros, they may be implied, and the assembler should put them in for you when it produces the object code. Most of the addresses would be different, of course, as the memory maps and ROM routines are totally different. It will probably be best to re-write from scratch in 68008 code. The programs will be considerably shorter (in source code form) and run perhaps five to ten times faster!

The QL contains an RF modulator, so it may be used with a colour TV. You will have to restrict the line width to 40 columns, in order to get adequate definition. Modulator input should be much more satisfactory with a B/W TV, and you should be able to get 64 columns. For best results, you will need an RGB monitor, and they can be rather expensive! It is not difficult to modify an ordinary colour TV for RGB input, if you know what you are doing. */

As you know, the QL is not yet available in Holland, and according to several articles I have read in English magazines, the delivery of ordered QLs has not yet begun in the UK.

Still, you've already set up a user group, and I wonder if you are interested in trying to make this an international effort?

In Holland we have one very big Hobby Computer Club which consists of a collection of User Groups. Most micro owners subscribe to the Club's monthly newsletter. They also have meetings with fellow "computerists".

I intend to start a QL user group here in Holland, and it seems to me to be a good idea to try and link this with your planned English user group.

To try and make this work. I suggest that we keep each other informed about developments.

Ron den Breems,
Kroonstaddreef 27,
3067 RT Rotterdam,
The Netherlands.

/* The best way to achieve this sort of interchange of information is to exchange newsletters. */

I ordered my QL on 18 January, two days before Sinclair "officially" started taking orders, and so I was promised one of the first batch. I will let you know as soon as it arrives.

However, I understand from a reliable source that the first pilot batch of 200 machines will not now be ready until late April, and most of these will be distributed to the press for review.

I wish you well, with the club and, time permitting, I will be happy to help in any way possible.

If the QL lives up to its specification, it looks as though it will be well worth waiting for.

Malcolm Newport,
26 Botany Road,
Walsall,
West Midlands,
WS5 4NE.

I hope that your involvement with the new Sinclair machine will not mean that we will be losing your services in NATGUG.

Although I had planned to replace my old Tandy Model I with a Model 4 I have to admit that the QL does look very attractive.

I would very much like to receive your newsletter, at least for the trial period. Why is it cheaper than NATGUG?

Dr. Mike Painter,
264 Altrincham Road,
Northenden,
Manchester M22 4AA.

/* NATGUG only cost £2 for a year when it started. The main cost will be producing Quanta, and until the QL deliveries start, we are unlikely to be getting much material, which will keep the print costs down, ergo, the low subscription. */

As a member of the QL queue I was most interested to read in PCN that you were setting up IQLUG.

Personally, I believe that tales of QL delays may well prove unfounded; at least the press could have waited for 28 days before rounding on Sir Clive.

However, I am not sure what to make of the package that arrived from Sinclair Research three days ago - containing two blank Microdrive tapes and nothing else, no letter, receipt, invoice, compliment slip? Oh well, I am not complaining.

C.M.F. Bone,
10 Garston Drive,
Watford,
Herts. WD2 6LB.

/* Legally, you are entitled to hang on to the Microdrive wafers until Sinclair collect them. You should not use them, however, as they are not really your property. In reality, I cannot see Sinclair bothering, so you will probably end up keeping the things. I hope your QL arrives soon. */

...

Hope it will be as good as the TRS-80 UG newsletter to which I subscribe, and which is my "quality reference" for joining IQLUG.

All the best in the new venture, the machine certainly looks worth supporting.

R.F. Cox,
14 Craighill Road,
Leicester,
LE2 3FA.

...

About ourselves, we are distributors of software around East Anglia and Europe. We manufacture software for the Spectrum and anticipate writing for the QL (when it arrives). We install business machines using our own and other peoples' software, and are interesting people in the QL in this area (for when it arrives).

We will be advertising in your newsletter in all, or at least, MOST of these categories. Please send us details.

Stan Quatermain,
13 Eastchurch Street,
Kenninghall,
Norfolk,
NR16 2EP.

I only buy one computer mag. these days, and so I fondly imagined that by placing an order as soon as I saw the advert, that I should be in the first batch. However, now having read about 500 a day, and the formation of your group, it seems likely to take months.

...

I have a 2001 PET and an Epson FX80 printer. What is known about a suitable cable or interface? Also, is it going to be easy to modify Quill so that it will call up all the facilities given by Epson, for example, proportional spacing?

I am also interested in the SDP, and I should like to be able to offer letters addressed to individual voters from the SDP, taken from the voting lists. Also by means of a questionnaire to find out what everyone would like to see happen.

To date the QL offers the only chance of doing these things at a reasonable cost, so I'm interested in finding more about it and what others have found out.

Joseph T. Harris,
26 Dare Road,
Birmingham,
B23 6PD.

/* The Epson FX80 should be easy enough to interface to the QL, although the FX80 will have to be fitted with a serial interface (around £80, I think) if it hasn't already got one. Hopefully, PSION have used the standard QL ROM printer driver, which Sinclair should have vectored through RAM. They used this approach on the Spectrum. It should be quite easy to Patch in your own driver code to support most of the FX80 features. Proportional spacing might cause problems with the Quill justifications however. */

As I have never previously used Sinclair computers any information you have re QL BASIC would be very welcome, and commands for the Microdrives. I have several programs which I am converting to the QL, but the Microdrive routines are currently at a standstill.

If I can be of any assistance with membership lists, accounts, etc., please let me know.

W. Kent,
90 Main Street,
Newton,
Derby DE55 5TE.

...

My company has two QLs on order, and hopes to produce several business packages for the machine this year.

Patrick S. Martin,
306 Manor Avenue,
Sale,
Cheshire M33 4NE.

I ordered a QL when the first order forms appeared just three weeks ago and am disappointed to learn from Sinclair today that they expect to deliver in May, 1984, I hope!

My main interest at the moment is to have a suitable monitor, and especially, a suitable printer, available when the QL arrives. Have you any information (beyond serial output only, initially) available, please, on which printers are fully compatible. I am thinking of an Epson FX80, but want to be sure that it will do full justice to the QL. Ditto with a Sanyo HR colour monitor.

Any copies of actual hands-on reviews of the QL and software provided would, of course, also be of interest.

H.J. Millen,
17 Castlemaine Avenue,
South Croydon,
Surrey CR2 7HU.

/* The FX80 should be ideal. As I said earlier, you need a monitor with RGB inputs. Someone might produce (if it is not already available) a little box to convert from RGB to composite video, enabling a cheaper monitor to be used, or a converted TV. */

I ordered the QL last week and now hear I could be in for a long wait. This would be disappointing, especially as this is my first micro, and I'm looking forward to it.

For what it is worth, my interests would be in suitable monitors, printers, and other peripherals, including ROM, but I suppose everybody is, and it is very early days yet.

Jonathan Whitaker,
72 Terregles Drive,
Pollokshields,
Glasgow G41 4RN.

Please enrol me in IQLUG for a six month trial subscription. Hopefully by the end of it my QL would have arrived!!

A. Yacobi,
56 Winchester Road,
Kenton,
Harrow,
Middx. HA3 9PE.

/* Don't we all!!! */

May I make use of the free advisory service immediately? I am currently using an Osborne I for word processing with an Olivetti Praxis 35 typewriter connected directly to the IEEE port as a printer. The socket in the Praxis is a 36-pin D-type socket. Can you recommend an interface to join the QL to my Praxis, preferably with a buffer memory as the typewriter is very slow.

Secondly. I am still waiting for delivery of my QL (alone with a lot of other people, I suspect). Are you able to give me any information or advice about the reliability, or otherwise, of Sinclair's delivery dates. They have written to me saying delivery will be before the end of May.

I was pleased to see that a users' group has been formed so soon, and I look forward to hearing more about the Group's activities.

John Hodgson.
95 Clissold Crescent,
London N16.

/* According to this month's PCW, an RS-232 interface is available for the Praxis 45D from Olivetti dealers. It rejoices in the name of IM45S. It costs £150, which seems rather a lot. I don't know if it fits the 35. You might need a different interface. A US company called Bytewriter are advertising a parallel interface for the 35 for \$165, in the February issue of Byte. Their address is:

125 Northview Road,
Ithaca,
NY 14850,
USA
Tel: (607) 272-1132.

You could use this with a print buffer fitted with a serial input and a parallel output. Aculab Ltd. of Leighton Buzzard make such buffers, with memory from 16K up to 256K. Their 'phone number is (0525) 371393. Alan Pound, who runs Aculab, has been very helpful to NATGUG members with tricky interfacing problems, and would probably sort it all out for you on a while-you-wait basis, if you took everything along to him. Unfortunately, I do not know of anyone who makes an RS-232 to IEEE converter. Does any member know of such a thing? */

QL DELIVERIES (OR NON-DELIVERIES!)

I recently sent the following letter to Mr. Nigel Searle, Managing Director of Sinclair Research Ltd.

Dear Mr. Searle.

I trust you found the first issue of Quanta, the newsletter of the Independent QL Users' Group (IQLUG), of interest.

In my Position as Acting Chairman, of IQLUG, and Editor of Quanta, I am writing to you for an explanation of the apparent inability of Sinclair to deliver QL systems within the advertised 28 day period. Many of our members who ordered systems as soon as it was announced have informed me that they have been notified that they will receive their machines by the end of April, making the actual delay more like 70 days!

In this week's issue of Popular Computer Weekly you are quoted as blaming the non-delivery of machines on "phenomenal demand". The same publication also claims that about 400 machines were ordered on the first day you were accepting orders. I find it impossible to believe that Thorn-EMI have been unable to build 400 machines in the five weeks or so that have elapsed since that first day.

It would appear that the real reason for your inability to ship the QL is some sort of problem with the hardware or software. I would appreciate a statement from yourself as to the true state of affairs, for inclusion in the next issue of our newsletter.

SINCLAIR RECOGNISE OUR EXISTENCE!

We recently received the following communication from a Mr. W. Hatty, Sinclair's Intellectual Property Manager:-

We notice that you are advertising "an independent non-profit making user's group" for SINCLAIR QL Computer owners and we will be glad to have a copy of the "objects of the Group" or "articles of association" as the case may be.

SINCLAIR is the owner of certain intellectual property related to the SINCLAIR QL Computer which may not be used without acknowledgment and / or approval. In the case of Copyright our approval is not normally given.

When we know something more of your organisation's intentions we will advise you further. Meanwhile we require you in any future advertisements to insert a footnote reading: "SINCLAIR and QL are Trade Marks of SINCLAIR Research Limited".

I sent Mr. Hatty the following letter, with a copy of the first issue of Quanta.

Dear Sir,

Brian Pain passed your letter of 20 February 1984 on to me for reply.

You requested a copy of the IQLUG "articles of association". I enclose a copy of the first issue of Quanta, the Group's newsletter, which includes the proposed constitution of the Group.

I hope that what we have published so far is acceptable to Sinclair Research Ltd. Please let us know if you disagree with any of the contents, and we will endeavour to conform to your requirements. We wish to remain on good terms with Sinclair Research Ltd., although you are quite likely to "get some stick" from us if you fall down on what we regard as your obligations to users, particularly with regard to delivery.

Although I was under the impression that there was no legal obligation in this country for an advertiser to mention the owner of a trade mark (unlike in the U.S.) we will of course amend any future advertisements in line with your stipulation. We will also insert a similar statement in all issues of the newsletter, from now on.

Incidentally, copies of Quanta have been sent to Sir Clive Sinclair and Mr. Nigel Searle, and they will receive complimentary copies of all future issues.

Please contact me if you would like any more information.

Leon Heller

SOFTWARE PIRACY

You might think it rather odd of a company like Sinclair to have an "Intellectual Property Manager", but in view of the widespread "pirating" of software and hardware, with a reported 10 pirated copies or so for every "official" version of a Spectrum game. the "chinese copies" of Apple machines, and the bewildering variety of IBM clones, they are only protecting their interests. It is our intention to support Sinclair in this matter, and we will endeavour not to publish any material that Sinclair regard as their "Intellectual Property". Such as detailed listings of disassembled ROM code, although it has yet to be established that anyone can copyright code held in ROM, or stored on a floppy disk or Microdrive. From a legal point of view the only satisfactory way to protect

software at present is for the supplier to make use of contract law, and require customers to sign an order form which includes the contract. This is how Tandy Corporation protect themselves. However, I have never heard of anyone being prosecuted for infringement of such a contract, although it must be occurring all the time. Sinclair have no such contract on their order form anyway, although they might have been wise to include it. If something is not done about software piracy soon, there will be no incentive for people to write programs for the mass markets and we will all lose out. Your committee intends to take a strong line about software piracy, and will attempt to discourage members from indulging in such activities (and that includes giving a copy of a commercial program to another member of the Group), particularly at workshops and local meetings.

Leon Heller

THE 0.5 MB MEMORY EXPANSION BOARD

I wouldn't hold your breath waiting for Sinclair's memory expansion unit. Looking at the photograph in the brochures it is obvious that to get half a megabyte in such a small case will mean the use of 256K RAMs. Only a couple of Japanese manufacturers are currently shipping these, and then only in sample quantities, at about £30 each. They will not be cost-effective compared with the 64K RAM until some time next year. I would expect independent hardware manufacturers to come out with memory expansion boards using the 64K RAM very soon (likely cost for 128K expansion around £100), with the possibility of replacing the 64K chips by 256K devices when they become available at a reasonable price. It might even be possible to replace the 64K chips on the main QL board by 256K RAMs. This would be the cheapest way to expand the memory, by far.

Leon Heller

FLOPPY DISK DRIVES

A major supplier of disk drives has joined the Group. This is quite significant, as Sinclair's hard disk must be at least a year away, and will probably cost somewhere between £500 and £1000, so there is obviously a big market for a floppy disk drive and controller board which can be interfaced to the QL, especially for business users.

I have been in touch with one company who are advertising QL drives. Due to an obvious lack of technical information regarding the QL bus, their drives will initially be interfaced via one of the RS-232 ports. The drives will have their own processor and controller circuitry, so when more information on the QL bus becomes available, users will merely have to return the drive for the RS-232 interface to be replaced by a bus interface, with EPROM-based software.

Leon Heller

QL EXPANSION BUS

Inspection of the photograph of the QL in the brochure reveals that the expansion bus consists of the unbuffered 68008 bus signals. This makes sense, as it keeps the cost down, and is similar to the way Sinclair did things on the ZX81 and Spectrum.

The provisional manual has no details of the bus connections, which will presumably be included in the version supplied with the machine.

Knowing the 68008 fairly well, I think I can say that it should be very easy to design and build simple add-ons for the QL. Perhaps the most popular would be a parallel printer interface. Others that spring to mind are a speech synthesiser and EPROM programmer. I have already designed several such items for my TRS-80, and it would not take long to adapt them for use on the QL. I intend to do this, and publish the designs in Quanta.

The bus connector appears to be a 64-way DIN 41612. Mating connectors are readily available from suppliers such as Technomatic and Watford Electronics. The best way to attach external circuitry would be a short piece of 64-way ribbon cable with a female connector on each end. The circuit board could be fitted with a mating male connector. Some enterprising manufacturer might produce a 64-way buffered mother board, with say, half a dozen socket positions, for single eurocards, which would offer some very interesting expansion possibilities.

Leon Heller

ANOTHER POINT OF VIEW

So you are thinking of buying a Sinclair QL or you already have one (lucky you!). Most likely some of you are upgrading from Spectrums etc. or maybe like me you are mad about computers.

If you are new to computers you have a lot to learn, or, if you have had one for a few years, you still have a lot to learn. To get to know everything is near impossible as new things are being developed faster than we can take it.

Now that you have spent £400 on a computer and maybe £250 on a printer your thirst for knowledge and information has started. To go it alone can be costly.

One of the best ways to learn is by sharing information with other users. You've taken the first step by joining IQLUG.

I have known Brian and Leon for a number of years now, and they have done a fantastic job with the TRS-80 Users' Group. One of the advantages of belonging to a users' group is the newsletter, so do write in with your problems, suggestions etc. It is surprising how much we can learn from one another.

Try and get together with other QL users in your local area, and maybe start your own "local" users' group. If Brian and Leon do their weekend workshops do try and attend; believe me, they are worth it. You can have one in your own area.

My own interest is communications, and I run the Hull Forum-80 computer bulletin board. If you do not know what a computer bulletin board is, send a S.A.E. for an information sheet. I will be starting a QL user section on Forum-80, plus programs for downloading in the library. More about this in a later issue. So, if your interest is international electronic mail, data transfer via the telephone system, or just exchanging programs with a friend across town, start saving up now for a modem.

Some of you will already have written some good BASIC Programs on other micros, so why not get them transferred to QL BASIC, as members are going to be hungry for software at this early stage, and you never know; someone else may already have that P.A.Y.E. or accounts program that you never found time to write.

While on the subject of programs, the Forum-80 library has a number of useful programs in Microsoft BASIC. If anyone is interested in converting them to QL BASIC I will give a list of titles to be printed in the next issue.

Frederick Brown.
421 Endike Lane,
Hull HU6 8AG.

/* On the subject of libraries, I see no reason why the NATGUG library could not form the basis of the IQLUG library. By using direct transfer between a TRS-80 and a QL via the RS-232 ports, the need for lengthy typing sessions is obviated. A lot of the programs should need very little alteration, although it would be nice if they could be modified to use the extra features provided by SuperBASIC. We have plenty of NATGUG members in IQLUG, are any of you interested in helping with the transfer process? */

IQLUG ON PRESTEL

One prospective member sent us a letter saying he had heard about us on Prestel. We did in fact send the Micronet people a copy of the press release.

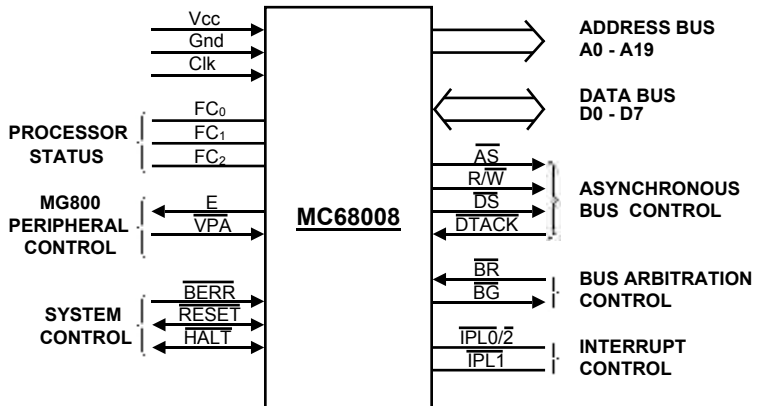
Although I spent several minutes searching the Micronet data base, I was unable to locate the page on which we are mentioned. This was a pity as I could have saved the Page in my TRS-80, and reproduced it in Quanta, making an interesting article. On second thoughts, this might not be a good idea, as it would be infringing their copyright! If anyone knows where we are mentioned, could they please let me know?

Leon Heller

68008 BUS SIGNALS

In the first issue of Quanta, I described the 68008 architecture. For the hardware freaks amongst you, here is a description of the 68008 bus signals. These will be especially relevant if you are thinking of designing your own add-ons, for connection to the QL expansion bus.

The signals are depicted below:-



The signals may be divided into eight groups. Each group will be discussed in turn. This discussion will necessarily be restricted to the simpler aspects of the signals. For a fuller description see Motorola publication ADI-939. Where I refer to an external device, this may be memory, I/O, or even another processor.

Address bus (A0 - A19)

This is a unidirectional three-state bus that determines which memory address is to be selected for a read or write operation. When an interrupt occurs, A1, A2 and A3 indicate the interrupt level. A0, and A4 - A19 are driven high.

Data bus (D0 - D7)

This 8-bit, bi-directional, three-state bus transmits data to and from the processor. During an interrupt, the external interrupting device supplies the interrupt vector number on these lines.

Asynchronous bus control

Most data transfers between the 68008 and external devices use these signals. The term asynchronous merely means that a handshaking technique is employed, enabling devices with different speed characteristics to be interfaced, each with its own handshaking, thus maximising system throughput.

ADDRESS STROBE (AS) indicates that the address bus carries a valid address.

Read/Write ($\overline{R/W}$) indicates whether a read or write operation is to take place via the data bus.

Data strobe (\overline{DS}) indicates that the data bus carries valid data for read and write operations.

Data transfer acknowledge (\overline{DTACK}) is an input from an external device that indicates to the processor that a data transfer has been completed. This is the handshaking signal mentioned above. Until \overline{DTACK} is returned, the processor generates wait states, allowing external devices of different speeds to be interfaced easily.

Bus arbitration control

These signals are used in a multi-processor environment to determine which device will be the bus master.

Bus request (\overline{BR}) is an input which indicates to the processor that another device wishes to become the bus master.

Bus grant (\overline{BG}) is an output that indicates to external devices capable of acting as bus masters that the processor is about to relinquish control of the bus.

Interrupt control

IPL0/IPL2 and IPL1 indicate the interrupt priority level when an external device is requesting an interrupt. Level 0 (both signals low) means that no interrupts are pending, and level seven (both signals high) represents a non-maskable interrupt, which will always be obeyed, whatever the level of the interrupt mask in the status register.

System control

These inputs are used by the processor to initiate a reset or halt condition, when external circuitry detects a problem with a transfer via the bus - a bus error.

Bus error (BERR) in conjunction with Halt is used to inform the processor that something nasty, such as a non-responding device, has occurred. Exception processing may then be performed, enabling the system to recover from the fault.

Reset (RESET) is a bi-directional signal used for a hardware reset of the processor. A software reset instruction results in this line being pulsed low, to reset external devices.

Halt (HALT) stops the processor when it is driven low. It will then wait until an interrupt or hardware reset occurs. Certain types of bus error can halt the processor. With a simple external circuit the HALT line may be used to single-step the processor.

If the Halt line and the Reset line are both driven low for more than 10 clock cycles, a total system reset occurs, except when power is first applied. In this case, both lines must be driven low for more than 100ms.

M6800 Peripheral control

These signals are used to interface the older 8-bit 6800 peripheral chips such as the 6821 PIA and the 6850 UART to the 68008. These chips are synchronous in nature, and are not easily interfaced to the asynchronous 68008 bus.

Due to a shortage of pins, the 68008, unlike the full 68000 device, cannot generate the valid memory address (VMA) signal needed by 6800 peripheral devices, and VMA must be generated with external circuitry. It only takes one chip.

Enable (E) is the standard 6800 enable signal. It has a period of 10 68008 clocks, so runs at 750 KHz on the QL; easily within the range of the standard 1 MHz 6800 peripheral chips.

Valid Peripheral Address (VPA) is an input that indicates to the 68008 that a 6800 peripheral device is being addressed. The 68008 then synchronises the data transfer with the Enable signal.

Processor status (FC0, FC1 and FC2) are outputs that indicate the state of the current cycle. That is, whether the processor is in the user or supervisor state, whether data or program references to the address space are occurring (these depend upon the addressing mode), or if an interrupt acknowledge processor state exists. These signals are valid when the address strobe is active (low), and may be latched using the AS strobe.

Clock (CLK) is a TTL clock signal. The standard clock rate for the 68008 is 8 MHz. The QL runs at 7.5 MHz. Versions of the 68008 that run at 10 MHz and 12.5 MHz will soon be available. The 68008, being a dynamic device, has a minimum clock rate of about 2 MHz.

The 68008, like most modern processors, requires a 5 V supply. It takes rather a lot of current, something like 250 mA, and runs quite hot.

In the next issue, we will deal with simple I/O using buffers and latches interfaced to the 68008 asynchronous bus.

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